IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Oestreicher et al.	ART UNIT:	3661
SERIAL NO.:	09/810,943	EXAMINER:	Pipala, E.
FILED:	March 16, 2001		
FOR:	A METHOD AND SYSTEM FOR DETERMINING WEIGHT AND POSITION OF A VEHICLE SEAT OCCUPANT		

ATTORNEY DOCKET NO: 60,426-268 (97P7720US03)

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APPEAL BRIEF

Dear Sir:

Subsequent to the filing of the Notice of Appeal on March 2, 2004, Appellant hereby submits its brief. Enclosed is a check for the appeal brief fee. Any additional fees or credits may be charged or applied to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds.

Real Party in Interest

The real party in interest is Siemens Automotive Corporation, the assignee of the entire right and interest in this Application.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 36-73 remain in the application including independent claims 36, 39, 41, 49, and 56. Claims 36-40 have been copied from U.S. Patent No. 6,039,344. Claims 56 and 57 are allowed. Claims 58-60 and 66-68 are indicated as allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

Claims 36-55, 61-63, and 69-73 stand finally rejected under 35 U.S.C. 103(a).

Claims 64 and 65 do not currently have any rejections applied against them.

Status of the Amendments

All amendments have been entered.

Summary of the Invention

The present invention provides a method and system for determining weight and/or position of a vehicle seat occupant to control the reaction of safety restraint systems, such as air bag modules and constant force sensors.

An object of the present invention is to provide a system that controls the reaction of the safety restraint system in response to the weight of the seat occupant and their position. For example, if the seat occupant is a child having a low weight, the air bag module will not be deployed. Further, the air bag deployment is modified if the seat occupant is improperly seated or too close to the dashboard.

A system for determining the weight and/or position of a vehicle occupant 10 that controls the reaction of a vehicle safety restraint system 12 includes weight sensors 14 located beneath a vehicle seat 16 and a controller 18 to determine the weight and position of the vehicle occupant in response to the output signals of the weight sensors. See page 5, lines 14-19.

The weight and position of the seat occupant can be determined by measuring the force or weight applied by the occupant to a seating surface, or seat pan 20, and to a seat back 22. A plurality of weight sensors 14 located between the seat and a designated seat mounting portion, for example, underneath the seat pan 20, are used to measure the forces applied to the seat 16. In one embodiment, the sensors 14 are disposed between the seat pan 20 and a seat mounting surface, or seat tracks 24. See page 5, lines 24-30.

In a preferred embodiment, the weight sensors 14 are located at the main connecting points of the seat pan 20 and the seat back 22 to the seat tracks 24. Referring to FIGS. 2 and 3, sensors 28, 30 are located at a first connection point near the front of the seat 16 where the seat pan 20 and seat tracks 24 connect. Sensors 32, 34 are located at a second connection point near the rear of the seat 16 where the seat pan 20, seat back brackets 36 and seat tracks 24 connect. Essentially, a sensor 14 is located near each corner of the seat pan 20. Such a mounting arrangement of sensors 28, 30, 32, 34 allows for all seat pan 20 and seat back 22 forces (F_n) to be transferred through the sensors to the controller 18. See page 6, lines 1-12.

Referring to FIGS. 4 and 5, each sensor 14 includes a seat surface engaging portion 38, a seat mounting surface engaging portion 40 and a walled portion 42 extending between the engaging portions 38, 40. As shown in FIG. 1, each sensor 14 includes at least one strain gage 44 mounted thereon. When a force is applied to the sensor 14, the walled portion 42 deflects and

the resulting wall deflection is proportional to the applied weight. Also, the walled portion 42 may include a sensor interface circuit 46 that allows the controller 18 to analyze a strain gage output signal 48 to calculate the weight and position of the seat occupant. See page 6, lines 14-22.

Referring to FIGS. 1 and 6, each sensor 14 may include the sensor interface circuit 46 which develops a pulse width modulation (PWM) signal 62 indicative of the applied weight to the sensor 14 that is applied to the controller 18. The circuit 46 includes a two-stage signal amplifier 84, pulse width modulation circuit 66, and temperature sensor/zeroing control circuit 68. Since the strain gage output signal 48 is at such a small voltage level, the two-stage signal amplifier 84 is needed to amplify the signal to a readable level. See page 7, lines 9-15.

From the PWM signal 62, the controller 18 can determine the weight of the seat occupant. Alternatively, the controller 18 can determine the center of gravity of the occupant and, from the center of gravity, the weight of the occupant. The center of gravity is centered somewhere within the confines of the sensor grouping. The center of gravity is determined by summing the forces applied to the sensors 28, 30 near the front of the seat pan 20 and then dividing the sum by the total of all the forces applied to the sensors 28, 30, 32, 34. In practice, it is found that the center of weight varies depending on the occupant and their seating position. See page 8, line 29 through page 9, line 5.

In FIG. 8, the seat occupant is seated in a normal seating position and in FIG. 9, the occupant is seated in a forward seating position. It is apparent by comparing FIGS. 8 and 9 that the center of gravity of the occupant seating in the forward position is much closer to the dashboard 90 than the center of gravity of occupant seating in the normal position. Furthermore,

FIGS. 8 and 9 show the relationship of the seat forces for normal and forward occupant seating positions. See page 9, lines 7-13.

The measured forces are directly related to the occupant's position in the seat. The occupant's force on the seat with a position is indicated as the force vector, $F_{occupant}$. The occupant's center of gravity is the position of $F_{occupant}$ on the seat. The measured forces at the front and rear respectively are F_f and F_r. For the normal seating position, the force at the rear, F_r is higher than the front, F_f. This is due to more of the occupant's weight being located in the upper body. With a high percentage of the occupant's weight in the upper body, the center of gravity is a good indication of the distance of the occupant's upper body to the dashboard 90. Alternatively, a position sensor may be mounted within the seat tracks to determine the distance between the seat and the dashboard 90. By combining the seat position and the seating position of the seat occupant, a position classification can be determined indicative of the occupant's position relative to the dashboard 90. See page 9, lines 15-27.

For the forward seating position, the occupant's upper body is leaning forward, causing the center of gravity to shift forward as indicated. Thus, the measured force at the front F_f is now larger than at the rear F_r. The change in the position of the upper body has a significant effect on the center of gravity. This center of gravity shift forward properly indicates a forward seated occupant, close to the dashboard 90. Thus, from the center of gravity, an accurate weight and position of the occupant can be determined. See page 9, line 29 through page 10, line 3.

From the center of gravity, a correction factor is calculated. The correction factor is used to determine the actual weight of the seat occupant. The correction factor is a correlation between the center of gravity and the seating position of the occupant. The correction factor may

be determined by, for example, but not limited to, using appropriate correction factor algorithms or look up tables. The correction factor is needed because the measured forces are proportional to the weight applied to the seat, but not directly related to the weight of the occupant. See page 10, lines 5-12.

In most seating positions only a variable part of the occupant's weight is applied to the seat. The percentage of weight seen on the seat is influenced by the position of the occupant. For example, in a standard seating position about 85% of the passenger's weight is seen on the seat. The rest is mainly applied to the floor of the car through the legs. A passenger leaning forward applies more weight to the floor than a passenger in a reclined position. Thus, use of the correction factor increases the accuracy of the measured weight. See page 10, lines 14-21.

The controller 18 calculates the weight and/or position of the occupant by sampling the response of each sensor to applied weight to the seat. FIG. 10 is a flow diagram of the operation of the weight and position system. The algorithm is initialized in step 92 and each sensor is sampled in step 94. The controller 18 samples the sensors 14 about every 30 milliseconds. Because of such a fast sample rate, the position of the seat occupant can be measured during pre-crash braking, as shown in FIG. 11. A biased average of each sensor output signal is taken over time in step 96, allowing for a better understanding of the occupant's weight. The averages are summed together to obtain a total force or weight parameter in step 98. Then, the center of gravity is calculated in step 100. The seating position of the seat occupant is determined from the center of gravity in step 102. Also, the correction factor is determined from the center of gravity in step 104. After the correction factor is determined, an actual weight of the occupant is found by multiplying the applied weight by the correction factor in step 106. From the weight

and position of the occupant, the controller determines the weight and position classifications in step 108. The controller sends the classification information to the safety restraint system which controls the reaction of the safety restraint system in step 110. See page 10, line 23, through page 11, line 9.

Issues

Is the final rejection of claims 36-55 under 35 U.S.C. 103(a) proper over the combination of Research Disclosure 39916 in view of U.S. Patent No. 5,810,392 to Gagnon and further in view of U.S. Patent No. 3,661,220 to Harris?

Is the final rejection of claims 61-63 and 69-73 under 35 U.S.C. 103(a) proper over the combination of Research Disclosure 39916 in view of U.S. Patent No. 5,810,392 to Gagnon and further in view of U.S. Patent No. 3,661,220 to Harris and further in view of U.S. Patent No. 5,906,393 to Mazur et al.?

Grouping of Claims

A. The rejection of claims 36-40 is contested.

B. The rejection of claims 41-44, 46, 47, 49, 50, 54, and 55 is separately contested, i.e. claims 41-44, 46, 47, 49, 50, 54, and 55 do not stand or fall with claims 36-40.

C. The rejection of claim 45 is separately contested, i.e. claim 45 does not stand or fall with claim 44.

D. The rejection of claims 48 and 51 is separately contested, i.e. claims 48 and 51 do not stand or fall with claims 47 and 50, respectively.

E. The rejection of claim 52 is separately contested, i.e. claim 52 does not stand or fall with claim 49.

F. The rejection of claim 53 is separately contested, i.e. claim 53 does not stand or fall with claim 52.

G. The rejection of claims 61 and 69 is separately contested, i.e. claims 61 and 69 do not stand or fall with claims 42 and 54, respectively.

H. The rejection of claims 62 and 70 is separately contested, i.e. claims 62 and 70 do not stand or fall with claims 61 and 69, respectively.

I. The rejection of claims 63 and 71 is separately contested, i.e. claims 63 and 71 do not stand or fall with claims 61 and 69, respectively.

J. The rejection of claim 72 is separately contested, i.e. claim 72 does not stand or fall with claim 71.

K. The rejection of claim 73 is separately contested, i.e. claim 73 does not stand or fall with claim 72.

Patentability Arguments

A. Claims 36-40

Claims 36-40 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

First, Harris is non-analogous art. The test for analogous art is whether the art is within the field of the inventor's endeavor and, if not, whether the art is reasonably pertinent to the problem with which the inventor was involved. In re Wood, 599 F.2d 1032, 1036, 22 USPQ

171, 174 (CCPA 1979). Harris is not in the field of appellant's endeavor and is not pertinent to any particular problem with which appellant was concerned.

The examiner argues that Harris is analogous art because "Harris does refer to the weighting device relating to the vehicle and does suggest the load cell system having a strain gauge mounting assembly (see at least the abstract)." Thus, the examiner seems to be arguing that Harris satisfies the first part of the test for analogous art, i.e. satisfies the requirement that the art is within the field of the inventor's endeavor. Appellant disagrees.

Harris, which discloses a load cell system for determining a payload weight of logs on a logging truck, clearly is not within the field of determining weight and position of a vehicle seat occupant, which is the subject to which the appellant's invention is directed. Appellant's and Harris' sensor systems have drastically different design objectives and operate in very different environmental conditions. Sensor systems for determining and continuously monitoring occupant weight and position are not related to, i.e. have no relevance to, sensor systems that measure the weight of a pile of logs loaded onto a logging truck. There simply is no technology disclosed in Harris that is relevant to a vehicle seat.

Further, Harris does not satisfy the second part of the test for analogous art, i.e. Harris does not logically commend itself to the attention of an inventor seeking to solve problems with accurately measuring seat occupant weight and determining seat occupant position. A reference is reasonably pertinent if, even though it may be in a different field of endeavor, it logically would have commended itself to an inventor's attention in considering his problem because of the subject matter with which it deals. See In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1061 (Fed. Cir. 1991).

Appellant was seeking to provide a more accurate and very sensitive weight measuring system that could clearly identify when a very small child or infant in a car seat was seated in the passenger seat so that air bag deployment could be prohibited or deployed at a significantly smaller deployment force. Harris was specifically seeking to provide a heavy-duty load determining system for logging trucks that could be subjected to an unprotected environment, and which could operate over rough, unimproved roads while accurately measuring several thousand pounds of logs. This allows each trailer to be loaded to the maximum capacity without exceeding regulatory load restrictions. See Column 1, lines 1-25. Thus, the problems that appellant was seeking to solve were very different than those of Harris.

Second, even assuming that Harris is analogous art, the mere fact that the prior art Research Disclosure and Gagnon structures could be modified does not make such modifications obvious unless the prior art suggests the desirability of doing so. There clearly is no suggestion or motivation to modify the Research Disclosure in the manner set forth by the examiner.

In response to appellant's arguments set forth during the prosecution of the application, the examiner argues that it is not "necessary that the references actually suggest, expressly or in so many words, the changes or improvements that application has made" and that the "test for combining references is what the references as a whole would have suggested to one of ordinary skill in the art." In previous responses, appellant has set forth specific arguments detailing why there is no suggestion to modify the Research Disclosure with Harris or Gagnon. The examiner has not responded to any of these arguments, other than with the generalized statement set forth above.

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. The extent to which such suggestion must be explicit in, or may be fairly inferred from, the references, is decided on the facts of each case, in light of the prior art and its relationship to the appellant's invention. It is impermissible to simply engage in a hindsight reconstruction of the claimed invention, using the appellant's structure as a template and selecting elements from references to fill in the gaps. The references themselves must provide some teaching whereby the appellant's combination would have been obvious. See In re Gorman, 933 F.2d 982, 986, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991).

There is no motivation or suggestion to modify the Research Disclosure system with the teachings of Gagnon. The examiner admits that the Research Disclosure does not explicitly disclose the use of weight sensor assemblies in the form of a strain gauge and a plurality of deflectable mounting structures, which together bear the entire weight of the frame.

The Research Disclosure teaches mounting four load cells between two rigid seat components. Specifically, the Research Disclosure discloses mounting load cells between a seat frame and a seat track.

Gagnon also teaches mounting a sensor assembly between two rigid seat structures. Specifically, Gagnon discloses a rigid seat pan member 18 and a rigid member 19 disposed vertically above the seat pan member 18 in a spaced apart and vertically juxtaposed relationship. See column 5, lines 19-22. The sensors 20 are mounted between these two rigid structures 19 and 18. Gagnon describes the sensors 20 as being a strain gauge, a load cell, or a variable resistance pressure sensor. The preferred sensor in Gagnon is a load cell having characteristics

specified at col. 5, lines 50-67. Gagnon does not disclose or teach that strain gauges have more beneficial properties than load cells.

Thus, both the Research Disclosure and Gagnon teach the use of load cells mounted between two rigid seat structures to determine seat occupant weight. The examiner has pointed to no teaching in Gagnon of any particular benefit to be derived from using a strain gauge in place of the load cell in the Research Disclosure, especially since the entire disclosure and all of the drawings are directed to the preferred embodiment, which utilizes a load cell. In addition, there is nothing in the Research Disclosure, that would have led one of ordinary skill in the art to believe the Research Disclosure load cell system was in any way deficient for the Research Disclosure system's purposes or was in need of modification.

If one of ordinary skill in the art were to modify the Research Disclosure system with the teachings of Gagnon, the modification would clearly be to utilize the specific load cell mounting configuration taught by Gagnon in place of the Research Disclosure mounting configuration, i.e., mounting the load cells between a seat pan and a rigid seat structure positioned above the seat pan as opposed to mounting load cells at the seat track positioned below the seat pan. One of ordinary skill in the art would have found no reason, suggestion, or incentive for attempting to replace the load cell sensors of the Research Disclosure with strain gauges, other than through the luxury of hindsight reconstruction performed by someone who first viewed appellant's disclosure. This is not the proper basis for a rejection under 35 U.S.C. 103(a).

There also is no motivation or suggestion to modify the Research Disclosure with Harris. The examiner admits that neither the Research Disclosure nor Gagnon teaches the use of a sensor having a deflectable portion and strain gauge, which is incorporated into a seat assembly. The

examiner relies on Harris as teaching a resilient mounting structure 40 having deflectable portions for supporting strain gauges.

Harris teaches the use of a steel load block assembly 40 mounted between the main vehicle frame 32 and the log support frame 31 above each tractor wheel at 22 and 23. The steel blocks 40 include strain gauges that are used to measure the weight of the logs. There is no teaching in Harris of the use of resilient or deflectable portions for strain gauges that are incorporated into vehicle seat assemblies. The examiner has pointed to no teaching in Harris of any particular benefit to be derived from this arrangement that could be applied to a vehicle seat structure. In addition, there is nothing in the Research Disclosure that would have led one of ordinary skill in the art to believe that the Research Disclosure's arrangement of mounting load cells between two rigid seat structures was in any way deficient for the Research Disclosure's purposes or was in need of modification.

Further, Gagnon, which the examiner relies upon for teaching the use of strain gauges in a seat application, teaches away from mounting strain gauges to deflectable portions or resilient members. Gagnon teaches the mounting of strain gauges between two rigid seat structures in a manner similar to that of the Research Disclosure.

Any suggestion to modify the Research Disclosure system in the manner proposed by the examiner is found only in a hindsight reconstruction of the claimed invention, with the examiner using the appellant's structure as a template and selecting elements from references to fill in the gaps. This is not a proper basis of a rejection under 35 U.S.C. 103.

Finally, even assuming that Harris is analogous art and that sufficient motivation exists to modify the Research disclosure as taught by Gagnon and Harris, the references taken together,

do not disclose, suggest, or teach all of the claimed features. Claim 36 requires the combination of a plurality of deflectable mounting structures that bear the entire weight of the seat frame and strain gauges mounted on the deflectable mounting structures.

The examiner admits that neither the Research Disclosure nor Gagnon disclose the feature of a seat sensor assembly with a strain gauge and deflectable portion that together bear the entire weight of a seat frame. The examiner argues that Harris teaches this feature, however, Harris does not include any teachings that show a seat sensor with a deflectable portion that bears the entire weight of a seat frame.

Further, the examiner argues that Harris's steel load block assembly 40 is equivalent to appellant's claimed "deflectable mounting structures" that bears the entire weight of the seat frame. While it is well settled that the terms in a claim are to be given their broadest reasonable interpretation, this interpretation must be consistent with the specification, with claim language being read in light of the specification as it would be interpreted by one of ordinary skill in the art. In re Bond, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990). Here, the examiner has improperly expanded the meaning to be given to the claim terms "deflectable mounting structures." Appellant's deflectable mounting structures are part of an occupant weight sensor assembly that includes strain gauges where the sensor assembly is mounted to a seat structure. One of ordinary skill in the art simply would not consider the steel blocks of Harris as corresponding to the claimed seat sensors with "deflectable mounting structures," especially as Harris clearly describes the steel blocks as being incorporated into a tractor-trailer structure for measuring the weight of a payload of logs.

Thus, for the many reasons set forth above, the rejection of claims 36-40 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

B. Claims 41-44, 46, 47, 49, 50, 54, and 55

Claims 41-44, 46, 47, 49, 50, 54, and 55 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, the references taken together, do not disclose, suggest, or teach all of the claimed features.

Claim 41 requires a plurality of sensors each of which includes a mounting portion for attachment to a vehicle seat structure, and a deflectable portion that deflects in response to a weight force applied to the vehicle seat structure to generate a weight signal.

The examiner argues that Harris teaches this feature, however, Harris does not include any teachings that show a seat sensor with a deflectable portion that deflects in response to an occupant weight force that is applied to a seat structure. Instead, the Harris system responds to a weight force applied to a trailer frame for a log hauling tractor-trailer vehicle. None of the cited references teach the use of a deflectable portion incorporated into a seat assembly that deflects in

response to a seat occupant weight force. The only teaching of this unique feature is found in appellant's disclosure.

Further, the examiner argues that Harris's steel load block assembly 40 is equivalent to appellant's claimed "deflectable portions" of a seat sensor having a mounting portion for attachment to a seat structure. While it is well settled that the terms in a claim are to be given their broadest reasonable interpretation, this interpretation must be consistent with the specification, with claim language being read in light of the specification as it would be interpreted by one of ordinary skill in the art. In re Bond, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990). Here, the examiner has improperly expanded the meaning to be given to the claim terms "deflectable portions." Appellant's deflectable portions are clearly shown in Figures 4 and 5 and are described in the accompanying specification. These deflectable portions are part of a sensor assembly that includes strain gauges where the sensor assembly is mounted to a seat structure in the specified orientation. One of ordinary skill in the art simply would not consider the steel blocks of Harris as corresponding to appellant's claimed seat sensors with "deflectable portions," especially as Harris clearly describes the steel blocks as being incorporated into a tractor-trailer structure for measuring the weight of a payload of logs.

Thus, for the many reasons set forth above, the rejection of claims 41-44, 46, 47, 49, 50, 54, and 55 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

C. Claim 45

Claim 45 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, the references taken together, do not disclose, suggest, or teach all of the claimed features.

Claim 45 includes the following combination of features: a plurality of sensors each including a mounting portion for attachment to a seat structure that receives the weight force, a support portion mounted to a seat track member, and a deflectable portion positioned between the mounting and the support portions.

The examiner argues that this is disclosed in Figure 3 of Harris. Appellant disagrees. Figure 3 shows that studs 50, 52, and 51 attach the block 40 to the bolster plate 30A that is attached to the front log support frame 31. Studs 50 and 51 are located at both upper ends of the block 40 and stud 52 is located in the middle. Studs 43 and 45 attach the block 40 to the mounting bed assembly 33 that is attached to the tractor frame 32 (see Figure 2). These studs 43, 45 are positioned at each lower end of the block 40. This configuration is very different than that set forth in claim 45.

Claim 45 requires the deflectable portion to be positioned between a mounting portion attached to a seat structure (to which the weight force is applied) and the support portion that is mounted to a seat track. The trailer structure in Harris to which the log weight force is applied is

mounted to the steel block 40 along the upper length. The tractor structure is mounted to the steel block 40 at each end of the block 40 along the lower length. Both the trailer mounting portion and the deflecting portion of the steel block 40 are shown in Figure 3 as being positioned between the studs 43, 45 that mount the mounting bed assembly 33 to the tractor frame 32. This configuration simply cannot be interpreted as corresponding to Appellant's claimed structure as set forth in claim 45.

None of the references teach the specific combination of features set forth in claim 45. Thus, for the many reasons set forth above, the rejection of claim 45 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

D. Claims 48 and 51

Claims 48 and 51 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, the references taken together, do not disclose, suggest, or teach all of the claimed features.

Claims 48 and 51 include the feature that the safety restraint device is not deployed if seat occupant weight is below a predetermined weight. The examiner argues that this feature is taught at column 7, lines 1-9 of Gagnon. Appellant disagrees. This section of Gagnon states:

> There is a need in the field of inflatable vehicle occupant restraints, such as airbags, to determine if the occupant of the front passenger seat of a motor vehicle equipped with a front passenger side airbag is an infant in an infant seat or a small child weighing less than a preselected amount. The device, such as a microprocessor which determines the weight that the rigid seat pan is bearing is preferably a controller which controls the activation of at least one safety device for an occupant of the seat based upon said weight.

Thus, Gagnon teaches deployment control based on measured weight. Gagnon does not teach non-deployment if occupant weight is below a predetermined weight.

None of the references teach the specific combination of features set forth in claims 48 and 51. Thus, for the many reasons set forth above, the rejection of claims 48 and 51 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

E. Claim 52

Claim 52 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, the references taken together, do not disclose, suggest, or teach all of the claimed features.

Claim 52 includes the step of determining a center of gravity of the seat occupant from weight signals that are generated in response to a weight force applied to a deflectable portion of a sensor assembly. The examiner has not presented any arguments as to where this feature is disclosed in the references.

Thus, for the many reasons set forth above, the rejection of claim 52 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

F. Claim 53

Claim 53 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, the references taken together, do not disclose, suggest, or teach all of the claimed features.

Claim 53 includes the step of controlling a safety restraint device based on the seat occupant weight and center of gravity. The examiner has not presented any arguments as to where this feature is disclosed in the references.

Thus, for the many reasons set forth above, the rejection of claim 53 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon and Harris is improper and should be withdrawn.

G. Claims 61 and 69

Claims 61 and 69 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris) and further in view of U.S. Patent No. 5,906,393 to Mazur et al. (Mazur).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris.

Further, there is no suggestion or motivation to modify the Research Disclosure with Mazur. The examiner admits that the Research Disclosure, Gagnon, and Harris do not teach the claimed features. The examiner argues that it would be obvious to modify the Research disclosure as taught by Mazur to satisfy the features of claims 61 and 69. The motivation that the examiner sets forth to support this modification is that it would "provide more accuracy of the occupant weight."

Mazur is directed to providing a controller that can control the sensing rate for a plurality of occupant position and weight sensors such that a less expensive controller can be used. In other words, as occupant sensing systems become more complex, Mazur was seeking to avoid increasing evaluation time and was seeking to avoid the need for faster, more powerful, and more expensive controllers. See Column 1, lines 45-56. There is no discussion of seeking to further improve system accuracy.

The examiner has pointed to no teaching in Mazur of any particular benefit to be derived from sampling the weight sensors in the Research Disclosure other than improved accuracy, which is not supported by the teachings of Mazur. In addition, there is nothing in the Research Disclosure, which would have led one of ordinary skill in the art to believe that the Research Disclosure system was in any way deficient for the Research Disclosure system's purposes or was in need of modification. One of ordinary skill in the art would have found no reason, suggestion, or incentive for attempting to sample the response of the sensors in the Research Disclosure system, as claimed by appellant, other than through the luxury of hindsight reconstruction performed by someone who first viewed appellant's disclosure. This is not the proper basis for a rejection under 35 U.S.C. 103(a).

Thus, for the many reasons set forth above, the rejection of claims 61 and 69 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon, Harris, and Mazur is improper and should be withdrawn.

H. Claims 62 and 70

Claims 62 and 70 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris) and further in view of U.S. Patent No. 5,906,393 to Mazur et al. (Mazur).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the

Research Disclosure with Harris. Further, for the reasons set forth in Section G, there is no suggestion or motivation to modify the Research Disclosure with Mazur.

Finally, the references taken together, do not disclose, suggest, or teach all of the claimed features. Claims 62 and 70 include the feature that the samples are every thirty milliseconds. The examiner has not presented any arguments as to where this feature is disclosed in the references.

None of the references disclose, suggest, or teach the claimed features. Thus, for the many reasons set forth above, the rejection of claims 62 and 70 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon, Harris, and Mazur is improper and should be withdrawn.

I. Claims 63 and 71

Claims 63 and 71 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris) and further in view of U.S. Patent No. 5,906,393 to Mazur et al. (Mazur).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, for the reasons set forth in Section G, there is no suggestion or motivation to modify the Research Disclosure with Mazur.

Finally, the references taken together, do not disclose, suggest, or teach all of the claimed features. Claims 63 and 71 include the feature that the weight is determined by computing a

biased average of each of the sensors over time and summing all of the biased averages together to obtain a total weight. The examiner has not presented any arguments as to where this feature is disclosed in the references.

None of the references disclose, suggest, or teach the claimed features. Thus, for the many reasons set forth above, the rejection of claims 63 and 71 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon, Harris, and Mazur is improper and should be withdrawn.

J. Claim 72

Claim 72 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris) and further in view of U.S. Patent No. 5,906,393 to Mazur et al. (Mazur).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, for the reasons set forth in Section G, there is no suggestion or motivation to modify the Research Disclosure with Mazur.

Finally, the references taken together, do not disclose, suggest, or teach all of the claimed features. Claim 72 includes the steps of determining occupant center of gravity based on measurements taken by the sensors and determining an occupant position based on total weight as determined from a biased average and the center of gravity. The examiner has not presented any arguments as to where this feature is disclosed in the references.

None of the references disclose, suggest, or teach the claimed features. Thus, for the many reasons set forth above, the rejection of claim 72 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon, Harris, and Mazur is improper and should be withdrawn.

K. Claim 73

Claim 73 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Research Disclosure 39916 (Research Disclosure) in view of U.S. Patent No. 5,810,392 to Gagnon (Gagnon) and further in view of U.S. Patent No. 3,661,220 to Harris (Harris) and further in view of U.S. Patent No. 5,906,393 to Mazur et al. (Mazur).

For the reasons set forth in Section A, Harris is non-analogous art, there is no motivation to modify the Research Disclosure with Gagnon, and there is no motivation to modify the Research Disclosure with Harris. Further, for the reasons set forth in Section G, there is no suggestion or motivation to modify the Research Disclosure with Mazur.

Finally, the references taken together, do not disclose, suggest, or teach all of the claimed features. Claim 73 includes the step of generating a correction factor based on the center of gravity and determining a corrected occupant weight by modifying the total weight by the correction factor. The examiner has not presented any arguments as to where this feature is disclosed in the references. Further, none of the references disclose, suggest, or teach the generation of any type of correction factor based on a center of gravity that is subsequently used to modify the total measured weight of the occupant.

Thus, for the many reasons set forth above, the rejection of claim 73 under 35 U.S.C. 103(a) based on the combination of the Research Disclosure as modified by Gagnon, Harris, and Mazur is improper and should be withdrawn.

Closing

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Appellant earnestly requests such an action.

Respectfully submitted,

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Dated: April 30, 2004

CERTIFICATE OF MAIL

I hereby certify that the enclosed Appeal Brief is being deposited, in triplicate, with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 30 day of April, 2004.

Laura Combs

CLAIMS APPENDIX

36. Apparatus comprising:

a vehicle seat frame;

a plurality of deflectable mounting structures which together bear the entire weight of said frame;

a plurality of vehicle occupant weight sensor assemblies, each of said weight sensor assemblies comprising a strain gauge mounted on a corresponding one of said deflectable mounting structures; and

a vehicle occupant protection device responsive to said weight sensor assemblies.

37. Apparatus as defined in claim 36 wherein said deflectable mounting structures support said frame on a track structure which guides movement of said frame.

38. Apparatus as defined in claim 37 further comprising a deflectable seat cushion on said frame.

39. Apparatus comprising:

a vehicle seat frame having a bottom portion and a back portion which together bear a vehicle occupant weight load;

a support structure which bears the entire weight of said frame and the entire magnitude of said occupant weight load, said support structure including a weight sensor apparatus which measures said entire magnitude of said occupant weight load; and

a vehicle occupant protection device responsive to said weight sensor apparatus,

said support structure including a pair of tracks which guide movement of said frame, said weight sensor apparatus comprising a plurality of weight sensor assemblies which measure portions of said occupant weight load acting on said tracks,

said weight sensor assemblies being operatively interposed between said frame and said tracks,

each of said weight sensor assemblies comprising a strain gauge mounted on a corresponding deflectable portion of said support structure.

40. Apparatus as defined in claim 39 further comprising a deflectable seat cushion covering said bottom portion of said frame.

41. A weight sensing apparatus for a vehicle seat comprising:

a plurality of sensors each including a mounting portion for attachment to a vehicle seat structure and a deflectable portion that deflects in response to a weight force applied to the vehicle seat structure to generate a weight signal; and

a controller for receiving said weight signals from said sensors to determine seat occupant weight.

42. An apparatus as in claim 41 including at least one strain gauge mounted to said deflectable portion of each of said sensors.

43. An apparatus as in claim 42 wherein said at least one strain gauge is a plurality of strain gauges mounted in a predetermined spaced relationship to each other on said deflectable portion.

44. An apparatus as in claim 42 wherein said seat structure is a seat pan.

45. An apparatus as in claim 44 wherein each of said sensors includes a support portion mounted to a vehicle seat track member such that said deflectable portion is positioned between said mounting and support portions.

46. An apparatus as in claim 44 wherein said seat pan is rectangular in shape defining four corners and said plurality of sensors is comprised of four sensors with one of said sensors mounted at each of said corners.

47. An apparatus as in claim 41 including a safety restraint device controlled by said controller in response to seat occupant weight.

48. An apparatus as in claim 47 wherein said safety restraint device is not deployed if seat occupant weight is below a predetermined weight.

49. A method for determining seat occupant weight including the steps of:

mounting a plurality of sensors to a vehicle structure with each sensor including a deflectable portion that deflects in response to a weight force applied to the vehicle seat structure;

generating a weight signal from each of the sensors in response to the deflection; and

determining seat occupant weight from the signals.

50. A method as in claim 49 further comprising the step of controlling a safety restraint device based on the seat occupant weight.

51. A method as in claim 50 further comprising the step of preventing deployment of the safety restraint device if the seat occupant weight is below a predetermined weight.

52. A method as in claim 49 further comprising the step of determining a center of gravity of the seat occupant from the signals.

53. A method as in claim 52 further comprising the step of controlling a safety restraint device based on the seat occupant weight and center of gravity.

54. A method as in claim 49 further comprising the step of mounting a strain gauge to the deflectable portion of each sensor.

55. A method as in claim 49 wherein the seat structure is a seat pan and the method further comprises the step of mounting the sensors between the seat pan and a seat track assembly.

56. A weight sensing apparatus for a vehicle seat comprising:

a plurality of sensors each including a mounting portion for attachment to a vehicle seat structure comprising a seat pan, a deflectable portion that deflects in response to a weight force applied to the vehicle seat structure to generate a weight signal, and a support portion mounted to a vehicle seat track member such that said deflectable portion is positioned between said mounting and support portions;

a plurality of strain gauges mounted to said deflectable portion of each of said sensors wherein said plurality of strain gauges comprises a first pair of strain gauges diametrically opposite from each other and mounted directly to said deflectable portion at a first position and a second pair of strain gauges diametrically opposite from each other and mounted directly to said deflectable portion at a section position spaced apart from said first position; and

a controller for receiving said weight signals from said sensors to determine seat occupant weight.

57. An apparatus as in claim 56 wherein both of said first pair of strain gauges are positioned between said second pair of strain gauges on a common surface of said deflectable portion.

58. An apparatus as in claim 42 wherein each of said sensors includes a sensor interface circuit mounted to said deflectable portion that develops a pulse width modulation signal indicative of the weight applied to said corresponding sensor.

59. An apparatus as in claim 58 wherein said sensor interface circuit includes a pulse width modulation circuit and a two-stage signal amplifier for amplifying said pulse width modulation signal to a readable level.

60. An apparatus as in claim 59 including a temperature control circuit for compensating for varying temperatures within the sensor interface circuit.

61. An apparatus as in claim 42 wherein said controller calculates weight of an occupant by sampling the response of each of said sensors to a weight applied to said vehicle seat structure.

62. An apparatus as in claim 61 wherein said controller samples said sensors approximately very thirty milliseconds.

63. An apparatus as in claim 61 wherein said controller determines the weight by computing a biased average of each of said sensors over time and summing all of said biased averages together to obtain a total weight.

64. An apparatus as in claim 62 wherein said controller determines occupant center of gravity based on measurements taken by said sensors and determines occupant position based on total weight and center of gravity.

65. An apparatus as in claim 64 wherein said controller generates a correction factor based on said center of gravity and determines a corrected occupant weight by modifying said total weight by said correction factor.

66. A method as in claim 54 including the steps of associating a sensor interface circuit with each sensor mounted to the deflectable portion and developing a pulse width modulation signal indicative of the weight applied to the corresponding sensor.

67. A method as in claim 66 including the steps of providing the sensor interface circuit with a two-stage signal amplifier and amplifying the pulse width modulation signals for each sensor to a readable level.

68. A method as in claim 67 including the step of providing the sensor interface circuit with a temperature control circuit for compensating for varying temperatures within the sensor interface circuit.

69. A method as in claim 54 including the step of calculating weight of an occupant by sampling the response of each of the sensors to a weight applied to the vehicle seat structure.

70. A method as in claim 69 including the step of sampling the sensors approximately very thirty milliseconds.

71. A method as in claim 69 including the steps of determining the weight by computing a biased average of each of the sensors over time and summing all of the biased averages together to obtain a total weight.

72. A method as in claim 71 including the steps of determining occupant center of gravity based on measurements taken by the sensors and determining occupant position based on total weight and center of gravity.

73. A method as in claim 72 including the steps of generating a correction factor based on the center of gravity and determining a corrected occupant weight by modifying the total weight by the correction factor.